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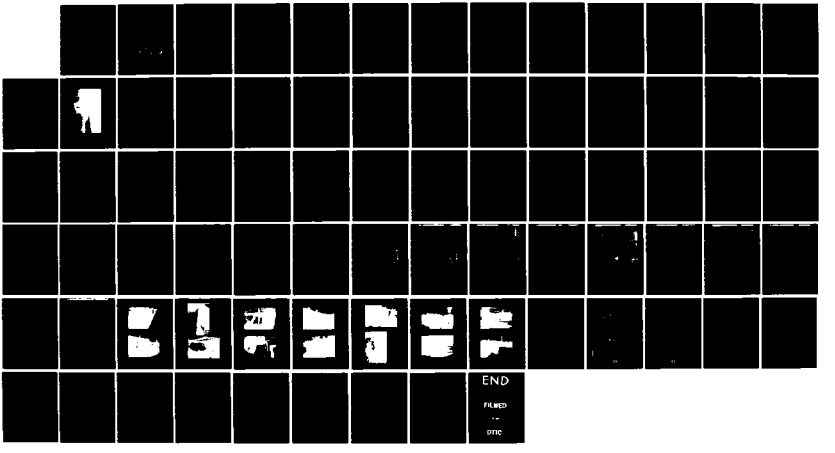

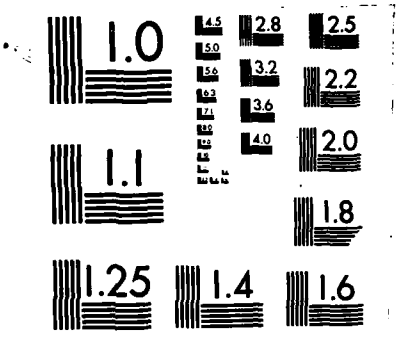

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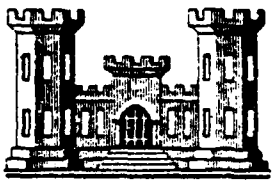
KENNEBEC RIVER BASIN
NEWPORT, MAINE

MAIN STREET DAM
ME 00114

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MAY 1981

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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4. TITLE (and Subtitle) Main Street Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Kennebec River Basin
Newport, Maine
East Branch Sebasticook River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The overall length of the dam is 340 ft. with an associated height of 19 ft. and a maximum storage capacity of about 216 acre ft. The dam is in fair condition based on visual inspection. There were no conditions noted which would warrent urgent remedial action. The size classification is small and the hazard classification is significant.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
NEDED

1981

Honorable Joseph E. Brennan
Governor of the State of Maine
State Capitol
Augusta, Maine 04330

Dear Governor Brennan:

Inclosed is a copy of the Main Street Dam (ME-00114) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Agriculture and to the owner, Guilford Industries, Guilford, Maine. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Agriculture for your cooperation in in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

KENNEBEC RIVER BASIN
NEWPORT, MAINE

MAIN STREET DAM
ME 00114

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MAY 1981

NATIONAL DAM INSPECTION PROGRAM
PHASE I INVESTIGATION REPORT

Identification No.:	ME 00114
Name of Dam:	Main Street
Town:	Newport
County and State:	Penobscot, Maine
Stream:	East Branch Sebasticook River
Date of Site Visit:	5 and 6 November 1980

BRIEF ASSESSMENT

Main Street Dam consists of an earth-filled masonry section between a concrete gravity spillway and canal intake at its left and right sides, respectively. Main Street Bridge crosses the East Branch Sebasticook River at the dam site. The overall length of the dam is 340 ft. with an associated height of 19 ft. and a maximum storage capacity of about 216 acre-ft. The watershed is tributary to the Kennebec River. Main Street Dam previously provided water power for industrial purposes. Presently the dam maintains an upstream pool for aesthetic and recreational purposes and for fire protection of the Guilford Industries mill located downstream of the dam.

Due to the possible loss of a few lives, that could result in the event the dam were to fail, Main Street Dam has been determined to have a "significant" hazard potential classification in accordance with Corps of Engineers guidelines.

The dam is in fair condition, based on a visual examination of the structure. Although some deficiencies were noted, there was no evidence of settlement, lateral movement or other signs of structural failure, or other conditions which would warrant urgent remedial action.

Based on the "small" size and "significant" hazard potential classifications, in accordance with Corps of Engineers guidelines, the adopted test flood for this dam is 1/4 the Probable Maximum Flood (1/4 PMF). With the water level at the top of dam, the spillway capacity is approximately 9,200 cfs. Hydraulic analyses indicate that the test flood outflow of 9,000 cfs can be passed without overtopping the dam.

Guilford Industries should engage a registered professional engineer qualified in the design and construction of dams to undertake the following investigations, as outlined in Section 7.2.

1. Perform an investigation to determine the nature and effect of the seepage at the downstream face of the dam adjacent to the spillway right training wall and determine what corrective measures are warranted.

2. Perform an investigation to determine the nature and effect of the seepage at the right side of the earth-filled section of the dam where it intersects the canal masonry dike and determine what corrective measures are warranted.

3. Determine the methods of removing the tree and brush growth from along the upstream face and downstream toe of the dam. Stumps should be removed and voids filled with suitable compacted material.

4. Determine whether the canal and canal intake structure should be abandoned and filled or if it should be restored. This determination should include but not be limited to consideration for the following:

    a. Evaluate the condition of the canal intake: including gates and operating mechanisms, training walls and the debris barrier, and determine the repairs necessary to restore the structure.

    b. Provisions for fire protection of the Guilford Industries mill.

    c. Determine the appropriate methods for removing the tree and brush growth from the joints of the canal overflow weir and masonry sections at either end of the weir. The resulting voids should be repaired as necessary.

        As part of this work, the existing loose joints, particularly at locations of leakage and seepage, should be repointed to halt further deterioration of the overflow weir.

d. Investigate the nature and effect of the undermining at the apron of the overflow weir and the corrective measures warranted.

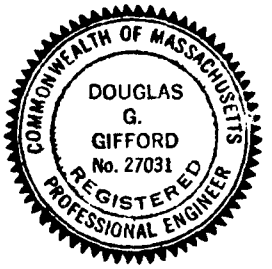
e. Determine the appropriate methods for repairing the breached and eroded portions of the earth dike. Repairs will require monitoring to insure that they remain permanent.

f. Determine the appropriate methods for removing the trees and brush from the earth dike. Stumps should be removed and voids backfilled with suitable compacted material.

At completion of this work, the earth dike should be provided with a well-developed growth of surficial vegetation which must be maintained periodically.

Any necessary modifications resulting from the investigations, and remedial measures, including repairs to the eroded and spalled concrete, outlet works gates and access bridge, and periodically removing debris from the upstream side of the dam, as outlined in Section 7.3, should be implemented by the Owner within one year after receipt of this report. The Owner should also prepare a formal operations and maintenance manual for the dam and establish an emergency preparedness plan and downstream warning system.

HALEY & ALDRICH, INC.
by:



Douglas G. Gifford
Vice President

This Phase I Inspection Report on Main Street Dam (ME-00114) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH W. FINEGAN, JR., CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm run-off), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential. Consideration of downstream flooding other than in the event of a dam failure is beyond the scope of this investigation.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be

eeded to minimize trespass and provide greater security for
ne facility and safety to the public. An evaluation of the
roject for compliance with OSHA rules and regulations is also
xcluded.

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The bridge abutments between the earth-filled section and the left side of the dam also serve as training walls within the spillway approach channel. Majob portions of both bridge abutments were either submerged or otherwise inaccessible for close examination. Visible portions of the bridge abutments appeared in good condition with some spalling.

c. Appurtenant Structures. The outlet works located at the right center of the spillway was in fair condition, Photo No. 7. The concrete abutments were generally deteriorated and eroded with some cracking present. Only the center of the three slide gates appeared to be in operable condition. This gate was partially open during the site visit, but, no attempt was made to operate it. The outlet works was accessible from the Main Street Bridge via three loosely placed planks across a steel post truss bridge. The steel portions of this footbridge were moderately rusted. Bolts anchoring the footbridge to the outlet works and the Main Street Bridge appeared in good condition.

The masonry dike defining the canal at the downstream right side of the dam was generally in fair condition, Photo No. 8. Water in the canal at the time of the site visit prevented close examination of the upstream face of the earth and masonry dikes. Loose joints in the masonry were observed at numerous locations on the downstream side of the dike and overflow weir. Seepage was noted along the top joint of the weir. Heavy brush growth and trees covered the crest and downstream face of the masonry surfaces. There were provisions for flashboards on the weir with several deteriorated boards in place. Undermining at the downstream apron of the weir was noted. The extent of this undermining was not determinable.

The intake gate at the head of the canal, just upstream of the alignment of Main Street, was in poor condition, Photo No. 9. The timber portions of the three slide gates were tilted downstream and badly deteriorated above the water line. All three gates were in a partially open position and inoperable. A steel bar rack was noted on the upstream side of the gates. A complete view of the bar rack was obscured by weed and brush growth over the top of the rack.

SECTION 3 - VISUAL EXAMINATION

3.1 Findings

a. General. The Phase I visual examination of Main Street Dam was conducted on 5 and 6 November 1980. The upstream water surface elevation was about 0.3 ft. above the spillway crest on both days.

In general, the project was found to be in fair condition. Some deficiencies which require correction were noted.

A visual inspection check list is included in Appendix A and selected photographs of the project are given in Appendix C. A "Site Plan Sketch", page C-1, shows the direction of view for each photograph.

b. Dam. Main Street Dam, the spillway, earth-filled section and intake structure, appeared to be in good to fair condition, Photo No. 1. The earth-filled section of the dam appeared satisfactory with no indication of major lateral movement or unusual settlement. Seepage estimated at 5 gpm was noted at the downstream face of the dam immediately adjacent to the spillway, Photo No. 2. Seepage estimated at 50 gpm was observed at the right side of the earth-filled section where it intersects with the masonry dike of the canal. Apparently an attempt to stabilize the seepage condition at this location was made by dumping granite block and rubble into the area, Photo No. 3. This prevented an accurate determination of the origin of the seepage. The maturity of tree growth on top of the rubble indicates that it has been a long standing condition. Loose joints in the mortared granite masonry were noted at the right side of the dam and in the vicinity of the seepage condition at the left side. In both cases, the rate of flow was constant and the water clear.

The concrete spillway of Main Street Dam appeared to be in good condition. However, flow over the structure precluded its close examination, Photo Nos. 4 and 5. The alignment of the visible portions of the spillway and the outlet works fronting the spillway did not indicate significant lateral movement or settlement. The concrete abutments at the left, Photo No. 6, and right ends of the spillway appeared to be in fair condition with eroded and spalled surfaces.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No design data for the original dam were located and none are believed to exist.

2.2 Construction Data

No data or records of the construction of the dam or the reconstruction of the spillway were located and none are believed to exist. The date 1897 is embossed in the stone masonry section and the date 1910 on the outlet works gate structure. In addition, a memorial erected in 1931, corresponding to the reconstruction of the Main Street Bridge, is located on the bridge. Plans dated 1930 (see Appendix B) for the reconstruction of Main Street Bridge were located and show much of the dam, both in plan and profile view.

2.3 Operation Data

No operational data pertaining to the facility were located.

2.4 Evaluation of Data

a. Availability. A list of the engineering data available for use in preparing this report is included on page B-1. Selected documents from the listing are also included in Appendix B.

b. Adequacy. There was a considerable amount of engineering data available to aid in the evaluation of Main Street Dam. A review of these data in combination with visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement, was adequate for the purposes of a Phase I assessment.

c. Validity. The information contained in the engineering data may generally be considered valid. However, details on the drawings may vary from the as-built conditions.

4.	Control mechanism.....	Manually operated with operator stand located above at platform El. 199.8 (estimated). Only the center gate mechanism was present.
5.	Other.....	There is a low level drain or sluiceway through the spillway near the left abutment. No method of operating this outlet was located during the site inspection. The invert elevation of this sluiceway is above that of the outlet works.

4.	Gates.....	None. A 45-ft. long section with flashboards located to left of outlet works structure.
5.	U/S channel.....	East Branch Sebasticook River restricted by bridge located immediately upstream of spillway.
6.	D/S channel.....	East Branch Sebasticook River with R.R. bridge approx. 300 ft. D/S of dam.
7.	General.....	The spillway weir is interrupted by the outlet works structure with 105 ft. of weir to the left of the stucture and 41.5 ft. to the right. An undetermined height of flashboards were located on a 45 ft. length of spillway to the left of the outlet works.

Canal Overflow Weir

1.	Type.....	3.5-ft. wide broad crested stone masonry
2.	Length of weir.....	70 ft.
3.	Crest elevation.....	195.5
4.	Gates.....	None

j. Regulating Outlet

1.	Invert.....	El. 186.3
2.	Size.....	4-ft. wide by 11-ft. high
3.	Description.....	Three wooden slide gates located at the right center of the spillway.

e. Storage (acre-ft.)

1.	Normal pool	96
2.	Flood control pool	Not applicable
3.	Spillway crest	96
4.	Top of dam	216
5.	Test flood pool	213

f. Reservoir Surface (acres)

1.	Normal pool	16
2.	Flood control pool	Not applicable
3.	Spillway crest	16
4.	Top of dam	16
5.	Test flood pool	16

g. Dam

1.	Type	Stone masonry retained earth fill and concrete gravity spillway
2.	Crest length	340 ft.
3.	Height	19 ft.
4.	Top width	41 ft. at earth fill section
5.	Side Slopes	At earth fill section 2H to 1V U/S; vertical downstream
6.	Zoning	Unknown
7.	Impervious Core	Unknown
8.	Cutoff	Unknown
9.	Grout curtain	Unknown
10.	General	A canal is located at the right side and runs parallel to the downstream river channel

h. Diversion and Regulating Tunnel..... Not applicable

i. Spillway

1.	Type	Concrete ogee weir
2.	Length of weir	146.5 ft. (effective)
3.	Crest elevation	196.0

b. Discharge at Dam Site

1.	Outlet works.....	Approx. 1,100 cfs with pool at spillway crest El. 196.0
2.	Maximum known flood at dam site.....	Unknown
3.	Ungated spillway capacity at top of dam with flashboards.....	9,200 cfs at El. 203.5
4.	Ungated spillway capacity at test flood pool elevation with flashboards...	9,000 cfs at El. 203.3
5.	Gated spillway capacity at normal pool elevation.	Not applicable
6.	Gated spillway capacity at test flood pool elevation.....	Not applicable
7.	Total spillway capacity at test flood pool elevation with flashboards..	9,000 cfs at El. 203.3
8.	Total project discharge at test flood pool elevation.....	9,000 cfs at El. 203.3

c. Elevation (ft. above NGVD)

1.	Streambed at centerline of dam.....	184.5
2.	Maximum tailwater.....	Unknown
3.	Upstream portal invert diversion tunnel.....	Not applicable
4.	Normal pool.....	196.0
5.	Full flood control pool..	Not applicable
6.	Spillway crest with flashboards.....	196.0
7.	Design surcharge - original design.....	Unknown
8.	Top of dam.....	203.5
9.	Test flood surcharge.....	203.3

d. Length of Reservoir (mi. estimated)

1.	Normal pool.....	0.4
2.	Flood control pool.....	Not applicable
3.	Spillway crest.....	0.4
4.	Top of dam.....	0.4
5.	Test flood pool.....	0.4

Newport for aesthetic and recreational purposes and by Guilford Industries for fire protection of their mill located downstream of the dam site.

h. Design and Construction History. There are no design or construction records available to document how and by whom the original dam was built.

i. Normal Operational Procedures. There is no formal written procedure for the operation of Main Street Dam. The existing outlet works, located at the right center of the spillway, incorporates three 4-ft. wide wooden slide gates, only one of which is reportedly operable. There are provisions for flashboards at the center of the spillway adjacent to the outlet works. Also a sluiceway or low-level drain is located through the left side of the weir. The outlet works is closed in the summer months and opened during the winter.

1.3 Pertinent Data

Field measurements using a hand level estimated the spillway crest to be at El. 196.8± based on a USGS Bench Mark located approximately 300 ft. downstream of the dam. Bridge plans prepared by the Maine Highway Commission dated May 1930 show a spillway crest elevation of 196.0 which has been adopted for this report. All other elevations presented in this report are based on field measurements relative to the adopted spillway crest elevation of 196.0.

a. Drainage Area. The 128-sq. mi. drainage area tributary to the dam site consists of sparsely developed wooded terrain which is primarily drained by the East Branch Sebasticook River. In addition to numerous small ponds, the upstream watershed contains Sebasticook, Pleasant, and Wassookeag Lakes which have a combined water surface area of approximately 10.5 sq. mi. or about 8 percent of the total drainage area.

A 2-ft. diameter penstock conveys flow from the downstream end of the canal, through the Guilford Industries mill complex where the water is used for fire protection purposes. From the mill, the flow is returned by a tailrace to the East Branch Sebasticook River approximately 1000 ft. downstream of the dam.

c. Size Classification. The storage to the top of Main Street Dam , El. 203.5, is estimated to be 216 acre-ft., and the corresponding hydraulic height of the dam is 19 ft. Storage of less than 1000 acre-ft. and a height of less than 40 ft. classifies this dam in the "small" size category according to guidelines established by the Corps of Engineers.

d. Hazard Classification. Dam failure analysis computations in Appendix D which are based on "Guidance for Estimating Downstream Dam Failure Hydrographs" demonstrate why Main Street Dam has been determined to have a "significant" hazard potential classification. A failure of Main Street Dam could impact on the wood framed commercial building located adjacent and immediately downstream of the left abutment. Water depths could increase by 2 or 3 ft. adjacent to this structure, resulting in the potential loss of a few lives.

e. Ownership. The name, address and phone number of the current owner are:

Guilford Industries
Guilford, ME 04443
Phone (207) 876-3331

All correspondence should be addressed to the attention of Mr. Harold Melvin.

f. Operator. Mr. Wilbur Bean, Chief of Maintenance at Guilford Industries Newport mill, is responsible for operation, maintenance, and safety of the dam. He has been associated with the dam for over 10 years. His phone number is (207) 368-4326.

g. Purpose of Dam. The dam was originally constructed to provide water power for industrial purposes. Presently the dam maintains an upstream pool which is used by the Town of

1.2 Description of Project

a Location. The dam is located on the East Branch Sebasticook River within the downtown area of Newport, Maine, as shown on the Location Map, page vii. The latitude and longitude of the dam site are N44°50.1' and W69° 16.4', respectively. The watershed is tributary to the Kennebec River.

b. Description of Dam and Appurtenances. Main Street Dam consists of an earth-filled masonry section, or causeway, between a concrete gravity spillway and canal intake at its left and right sides, respectively. The spillway is located 16 ft. downstream of the Main Street Bridge, which crosses the East Branch Sebasticook River at the dam site. A canal is located downstream of the right side of the dam, with an overflow weir in a side channel configuration. The centerline crest length of the dam is approximately 340 ft. with an associated height of 19 ft. The Main Street bridge/roadway curb, at El. 203.5, is the top of dam.

At the upstream side the earth-filled section extends outward into the upstream pool at an undetermined slope with no riprap protection. On the downstream side, the stone masonry is near vertical in alignment.

From left to right training wall the spillway is approximately 166.5 ft. long. The outlet works gate structure is 20-ft. wide and is located 105 ft. from the left spillway training wall, giving the spillway an effective crest length of 146.5 ft. The crest of an approximately 45-ft. long section of the spillway is raised to the permanent crest elevation by wood flashboards. This section is located between the left spillway training wall and the gate structure.

All the wooden outlet works gates are 4-ft. wide and are operated by manual gate lift mechanisms. Located at the upstream side of the Main Street Bridge is the canal intake. This intake consists of three 7-ft. wide wooden gates.

At the upstream end of the 70-ft. long broad crested canal overflow weir is a 38-ft. long dike built of stone masonry. Downstream of the weir, a 60-ft. long stone masonry section connects an earthen dike to the overflow weir. The earth dike has an overall length of approximately 200 ft. with a crest width that varies from approximately 4 ft., at the upstream end, to 12 ft., at the downstream end.

PHASE I INVESTIGATION REPORT
NATIONAL DAM INSPECTION PROGRAM

MAIN STREET DAM
ME 00114

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority. Public law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England region.

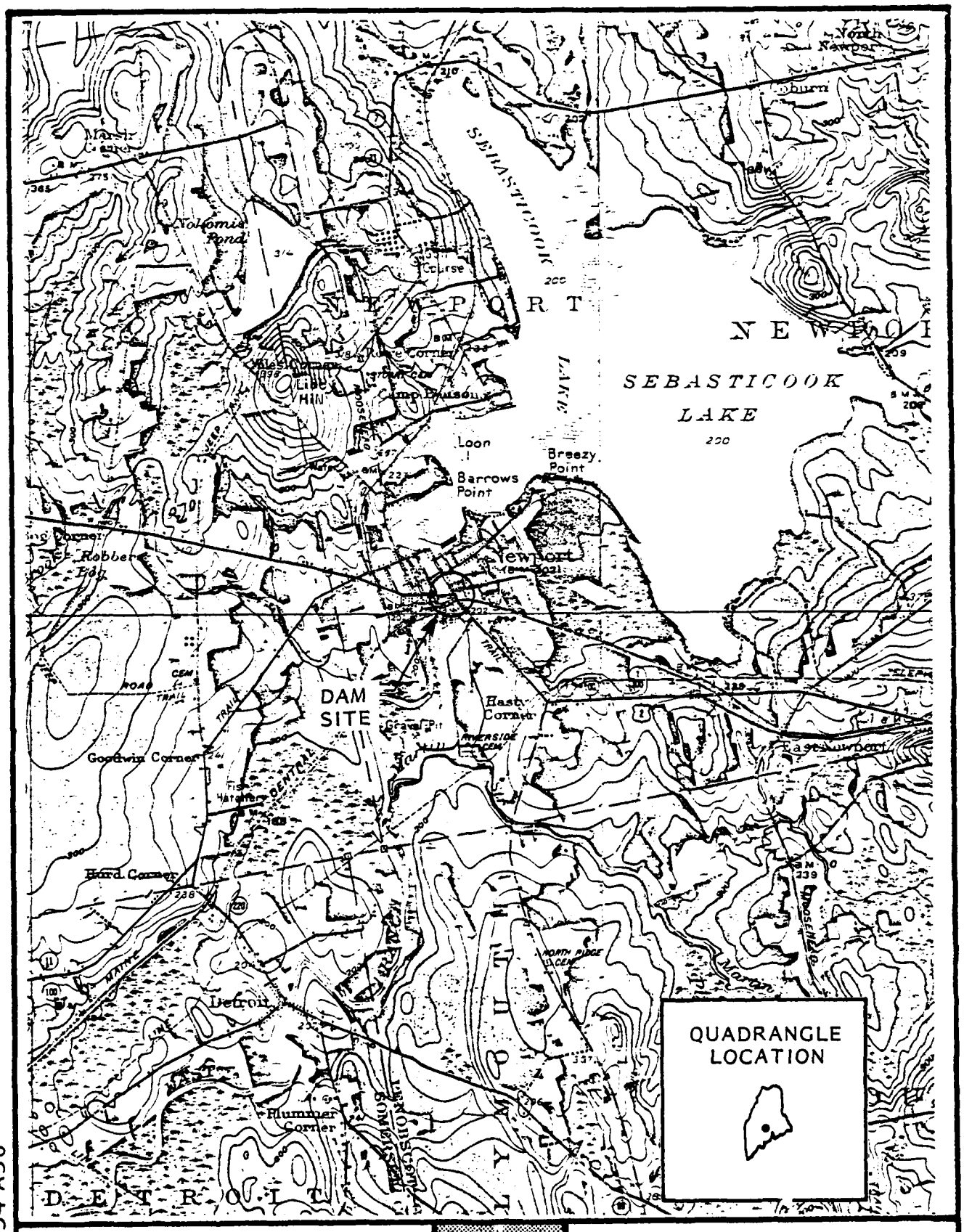
Haley & Aldrich, Inc. has been retained by the New England Division to inspect and report on selected dams in the States of New Hampshire and Maine. Authorization and notice to proceed were issued to Haley & Aldrich, Inc .under a letter dated 31 October 1979 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW33-80-C-0009 has been assigned by the Corps of Engineers for this work. Camp, Dresser & McKee, Inc. was retained as consultant to Haley & Aldrich, Inc. on the structural, mechanical/electrical and hydraulic/hydrologic aspects of the Investigation.

b. Purpose of Inspection. The primary purposes of the National Dam Inspection Program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

2. Encourage and prepare the states ot initiate effective dam safety programs for non-Federal dams.

3. Update, verify, and complete the National Inventory of Dams.



FILE NO. 4454 A50

DAM: Main Street

IDENTIFICATION NO. ME 00114

N

LOCATION MAP

U.S.G.S. QUADRANGLE

PITTSFIELD, ME

APPROX. SCALE: 1" = 1 MILE

1. Overview of Main Street Dam showing upstream side

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The alignment of the bar rack was distorted as its midsection was bent in a downstream direction, apparently influenced by the tilting of the gate timbers. The concrete training walls abuting the gate facility were cracked and spalled and in generally poor condition. Visual observations indicated lateral movement of both walls. However, these walls are not considered pertinent to the safety of the dam due to their location.

The earthen canal dike was in poor condition. Mature tree growth was prevelant along the crest and downstream side. A 5-ft. deep by 5-ft. wide breach at the downstream end of the dike was spilling water back into the downstream channel, Photo No. 10. An attempt to arrest this condition by placing debris and rubble into the breach was not significantly detouring the flow. A sewer outfall pipe crosses the canal and passes through the dike. A significant portion of the dike adjacent to the pipe was eroded and undercut by water flowing from a break in the pipe, Photo No. 11. Flow resulting from a failure of the dike at either location would be restricted by the intake structure. However, a hazardous condition would exist during the failure and drainage of the reservoir would result.

The Main Street Bridge appeared to be in good alignment, Photo No. 12. However, cracks in the pavement Photo No. 13, were indicative of some differential settlement of the bridge between supports.

d. Reservoir Area. The impounded portion of the East Branch Sebasticook River, Photo No 14, extends upstream approximately 2000 ft. to the Sebasticook Lake Outlet Dam, also known as North Street Dam. Both banks of the impoundment are heavily developed and two roadway bridges span the river in addition to the Main Street Bridge.

e. Downstream Channel. The East Branch Sebasticook River flows approximately 8 mi. through an essentially undeveloped marsh area before joining the Sebasticook River. A railroad bridge, Photo No. 15, is located about 300 ft. downstream of the dam with the top of tracks about 6 ft. above the spillway crest elevation.

3.2 Evaluation

Based on the visual examination conducted on 5 and 6 November 1980, Main Street Dam is considered to be in fair condition. The seepage observed adjacent to the spillway right training wall and at the intersection of the dam with the stone masonry dike of the canal warrants further investigation. Trees and brush along the upstream face and downstream toe of the dam shoud be removed and a determination made of whether the canal should be abandoned and filled or restored. The recommendations and remedial measures outlined in Sections 7.2 and 7.3 should be implemented to correct the noted deficiencies.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General. There are no formal procedures for the operation of the dam.

b. Description of any Warning System in Effect. There is no warning system or emergency preparedness plan in effect for this facility.

4.2 Maintenance Procedures

a. General. There are no established formal procedures or manuals for inspection and maintenance of the dam. Remedial measures pertaining to the dam are performed on the basis of need as determined by the Owner.

b. Operating Facilities. There is no formal plan to maintain or regulate the outlet works and controls. The operability of the one slide gate whose mechanism was intact was not demonstrated during the site visit. It was reported that opening this single gate provides sufficient outlet works capacity to lower the reservoir during normal flow. Though there was evidence of a reservoir drain or sluiceway through the spillway, nothing could be ascertained about its method of operation.

4.3 Evaluation

The Owner should prepare an operations and maintenance manual for the dam. The manual should delineate the routine operational procedures and maintenance work to be done on the dam to provide satisfactory operation and minimize deterioration of the facility. An annual observation and maintenance program should be established to examine the dam, control vegetation growth and maintain slopes, walls and channels. A formal procedure should be established to operate the outlet works periodically. Since failure of the dam could potentially cause loss of life and property damage downstream, the Owner should prepare and implement a formal emergency preparedness plan and warning system.

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Main Street Dam, which is located on the East Branch Sebasticook River in Newport, Maine, is approximately 340-ft. long. A 38-ft. wide paved roadway bridge crosses the river at the dam site. The spillway approach channel extends approximately 16 ft. beyond the downstream face of the bridge to a 166.5-ft. long concrete ogee spillway. Three 4-ft. wide wooden slide gates comprise the outlet works stucture which is incorporated into the spillway and has an overall width of 20 ft., thus reducing the effective spillway length to 146.5 ft. The spillway crest elevation is 196.0 and the top of dam (top of roadway curb) is El. 203.5. A 45-ft. long section of the spillway weir located about 4 ft. to the left of the outlet works structure incorporates an undetermined height of flashboards. The top of these flashboards appeared to be at El. 196.0. The vertical clearance between the underside of the bridge deck and the spillway crest is about 3 ft.

The total drainage area tributary to the dam site is about 128 sq. mi. The Sebasticook Lake Outlet Dam, also known as North Street Dam, is located approximately 2000 ft. upstream of the Main Street Dam and impounds Lake Sebasticook which has a normal water area of about 6.9 sq. mi. The estimated normal impoundment upstream of the Main Street Dam is less than 100 acre-ft.

5.2 Design Data

There is no hydrologic/hydraulic design data available for the dam.

5.3 Experience Data

No records of historical floods at the dam site were located other than a note on a plan for the Main Street Bridge Plans dated May 1930 which indicates that the "extreme high water" as of that date occurred in May 1923 and was 1.5 ft. above the spillway crest.

5.4 Test Flood Analysis

Based on the Corps of Engineers Guidelines, the recommended test flood range for the size "small" and hazard potential "significant" is the 100-yr. flood to a 1/2 PMF (Probable Maximum Flood). The 1/4 PMF is within the recommended test flood range and was adopted as the test flood for this facility because the storage at top of dam is near the lower end of the "small" size category. The upstream watershed is sparsely developed, heavily wooden terrain and incorporates three lakes having a combined water surface area of approximately 10.5 sq. mi. or about 8 percent of the total drainage area. From the Corps of Engineers Guideline Curves for Estimating Probable Maximum Floods, a peak PMF inflow rate of 375 csm was adopted for flat and coastal terrain which results in a 1/4 PMF test flood inflow of 12,000 cfs.

Surcharge storage routing of the inflow was not performed due to the negligible volume of impoundment upstream of the Main Street Dam. However, the test flood inflow was reduced by 25 percent to account for attenuation by Lake Sebasticook. The resulting test flood at the dam site is therefore estimated to be about 9,000 cfs.

The estimated spillway capacity with the spillway headwater level at top of dam (El. 203.5) is 10,750 cfs. However, at this stage the spillway approach channel head losses through the bridge are estimated to be about 0.9 ft. indicating that the estimated spillway discharge capacity is reduced to approximately 9,200 cfs. The project is considered to be hydraulically adequate to pass the test flood flow of 9,000 cfs without overtopping the dam.

5.5 Dam Failure Analysis

Based on Corps of Engineers Guidelines for estimating dam failure hydrographs, and assuming that a 40-ft. long section of the spillway were to fail with the upstream pool at top of dam (El. 203.5), the combined peak failure outflow is estimated to be about 12,100 cfs. In the event of a dam failure, a wood-framed commercial building located at the downstream left abutment of the dam would be seriously threatened. Flood depths adjacent to this structure could increase by 2 or 3 ft. as a result of a dam failure. The first floor window sills of the structure are about 2 ft. lower than the spillway crest. There is no other development between the dam and a railroad embankment/bridge located about 300 ft. downstream of the dam which would be impacted by a dam failure.

The Owner's mill complex located on the right bank of the river downstream of the railroad embankment would be flooded by the full spillway discharge occurring prior to failure. Although some increase in flooding depths would result from a dam failure, the buffering affect of the railroad embankment together with the small impoundment volume of about 216 acre-ft., which could be released if the dam failed, indicate that no additional loss of life would be expected within the mill complex. Downstream of the mill, the river enters a large, undeveloped marsh area.

Consequently, the potential loss of life resulting from a dam failure would be a few and the dam is accordingly classified in the "significant" hazard category.

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

There was no visual evidence of significant settlement or lateral movement of the earth-filled masonry portion of Main Street Dam. The two seepage conditions observed at the downstream face of this section, in addition to a breach and erosion condition of the earth dike, warrant attention. The overall structural stability of the dam appeared satisfactory.

The spillway was obscured by flowing water during the site inspection preventing a close examination. Based on observed conditions, no reason was found to question the structural stability of the spillway.

The outlet works of Main Street Dam warrants attention to prevent further deterioration. The cracking and erosion of the concrete should be repaired. However, the structural stability of the outlet works appears to be satisfactory at the present time.

The structural stability of pertinent portions of the stone masonry canal wall and overflow weir appeared satisfactory. There was no visual evidence of major settlement or lateral movement.

6.2 Design and Construction Data

No design plans or construction data were located for the facility. Probable cross-sections of the dam are included in design drawings for the Main Street Bridge by the Maine Highway Commission Bridge Division dated May 1930. Based on conditions observed during the site examination, the dam is expected to have an adequate factor of safety relative to stability under normally expected static loading.

6.3 Post-Construction Changes

The outlet works of Main Street Dam is constructed of concrete and has an embossed date of 1910. The major portion of the dam is constructed of stone masonry with an

embossed date of 1897. Reportedly, the spillway portion of the dam was reconstructed in 1973. No other information relative to post-construction changes are known.

6.4 Seismic Stability

Main Street Dam is located in a Seismic Zone 1 and in accordance with recommended guidelines does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual examination of Main Street Dam indicated the facility was in fair condition. Although there were no signs of impending structural failure or other conditions which would warrant urgent remedial action, deficiencies in the form of deterioration and cracking of the concrete portions of the outlet works, two seepage conditions at the downstream face of the dam and a shallow breach and an eroded section of the earth dike were noted.

Based on the results of computations included in Appendix D and described in Section 5, the spillway is capable of passing the test flood. With the water level at the top of the dam on the upstream face, the spillway capacity is approximately 9,200 cfs which is adequate to pass the estimated test flood of 9,000 cfs.

b. Adequacy of Information. This evaluation of the dam is based primarily on visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement. Generally, the information available or obtained was adequate for the purpose of a Phase I assessment.

c. Urgency. The recommendations for additional investigations and remedial measures outlined in Sections 7.2 and 7.3, respectively, should be undertaken by the Owner and completed within one year after receipt of this report.

7.2 Recommendations

It is recommended that the Owner engage a registered professional engineer qualified in the design and construction of dams to undertake the following investigations:

1. Perform an investigation to determine the nature and effect of the seepage at the downstream face of the dam adjacent to the spillway right training wall and determine what corrective measures are warranted.

2. Perform an investigation to determine the nature and effect of the seepage at the right side of the earth-filled section of the dam where it intersects the canal masonry dike and determine what corrective measures are warranted.

3. Determine the methods of removing the tree and brush growth from along the upstream face and downstream toe of the dam. Stumps should be removed and voids filled with suitable compacted material.

4. Determine whether the canal and canal intake structure should be abandoned and filled or if it should be restored. This determination should include but not be limited to consideration for the following:

   a. Evaluate the condition of the canal intake; including gates and operating mechanisms, training walls and the debris barrier, and determine the repairs necessary to restore the structure.

   b. Provisions for fire protection of the Guilford Industries mill.

   c. Determine the appropriate methods for removing the tree and brush growth from the joints of the canal overflow weir and masonry sections at either end of the weir. The resulting voids should be repaired as necessary.

      As part of this work, the existing loose joints, particularly at locations of leakage and seepage, should be repointed to halt further deterioration of the overflow weir.

   d. Investigate the nature and effect of the undermining at the apron of the overflow weir and the corrective measures warranted.

   e. Determine the appropriate methods for repairing the breached and eroded portions of the earth dike. Repairs will require monitoring to insure that they remain permanent.

f. Determine the appropriate methods for removing the trees and brush from the earth dike. Stumps should be removed and voids backfilled with suitable compacted material.

At completion of this work, the earth dike should be provided with a well-developed growth of surficial vegetation which must be maintained periodically.

The Owner should then implement corrective measures on the basis of these engineering evaluations.

7.3 Remedial Measures

Although the dam is generally in fair condition, it is considered important that the following items be accomplished.

a. Operation and Maintenance Procedures. The following should be undertaken by the Owner:

1. Repair the eroded, spalled and generally deteriorated concrete of the spillway abutments.

2. Repair the deteriorated and cracked areas of the concrete portions of the outlet works and maintain at least one slide gate in good operating condition.

3. Remove the loosely placed wood planks across the outlet works access bridge and install a permanent, stable walkway. The steel portions of the bridge should be painted periodically to inhibit rust and deterioration of the bridge.

4. Periodically remove the debris from the upstream side of the dam, particularly in the vicinity of the spillway.

5. Prepare an operations and maintenance manual for the dam. The manual should include provisions for annual technical inspection of the dam and for round-the-clock surveillance of the dam during periods of heavy precipitation and high project

discharges. The procedures should delineate the routine operational procedures and maintenance work to be done on the dam to ensure safe, satisfactory operation and to minimize deterioration of the facility.

The next technical inspection should be scheduled during a period of low flow, or during a period when the normal pool has been lowered or drained, to allow a more detailed inspection of the spillway and bridge foundation piers.

6. Develop a written emergency preparedness plan and warning system to be used in the event of impending failure of the dam or other emergency conditions for the specific dam. The plan should be developed in cooperation with local officials and downstream inhabitants.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A - INSPECTION CHECK LIST

VISUAL INSPECTION PARTY ORGANIZATION
NATIONAL DAM INSPECTION PROGRAM

Dam: Main Street Dam

Date: 5 November 1980 and 6 November 1980

Time: 1300-1700 hrs. 0800-1000 hrs.

Weather: Overcast - Temperature in low 50's

Water Surface Elevation Upstream: 196.3 (NGVD) (Approximately 0.3 ft. above spillway crest, both days)

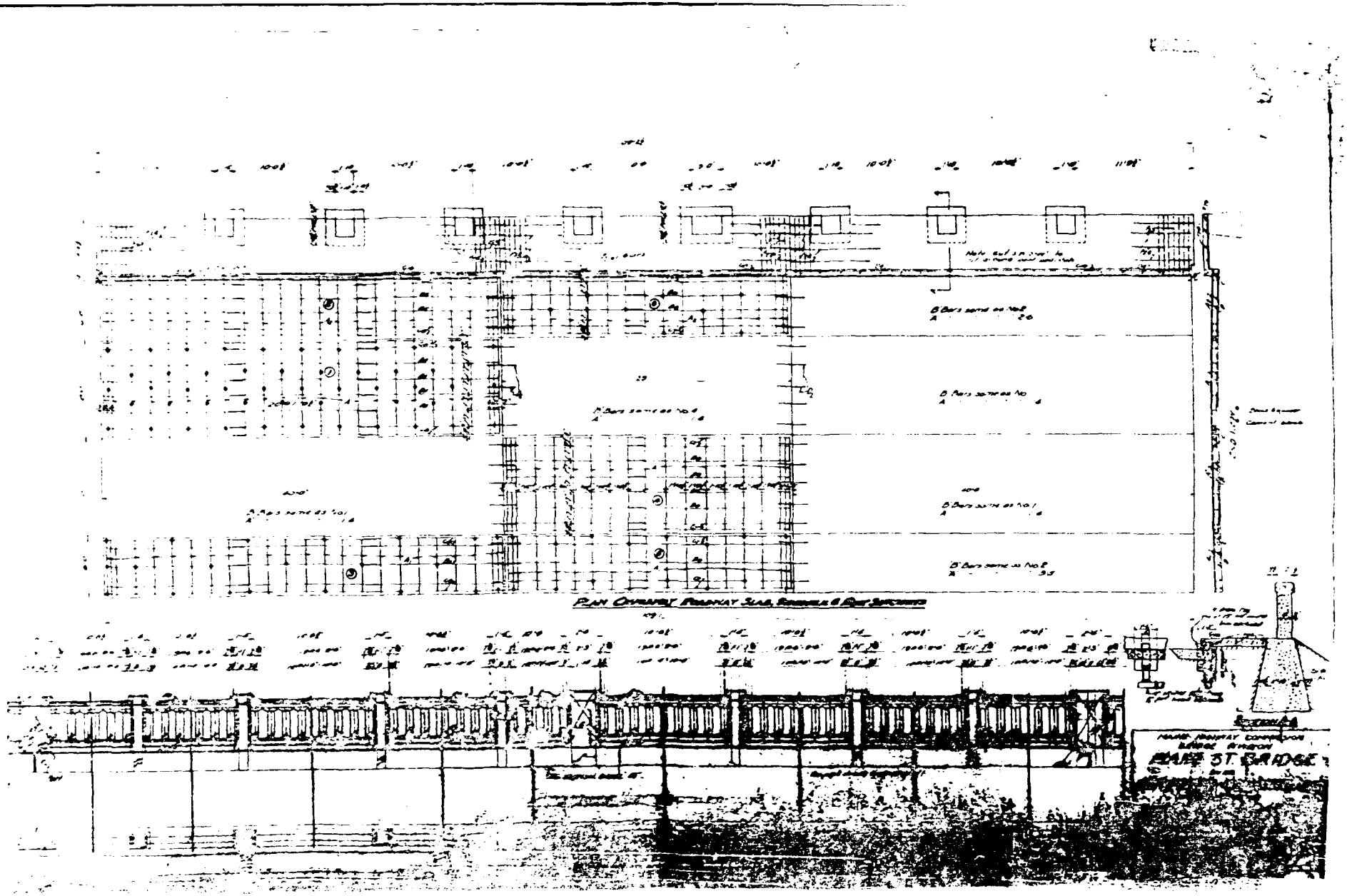
Stream Flow: Approximately 70 cfs

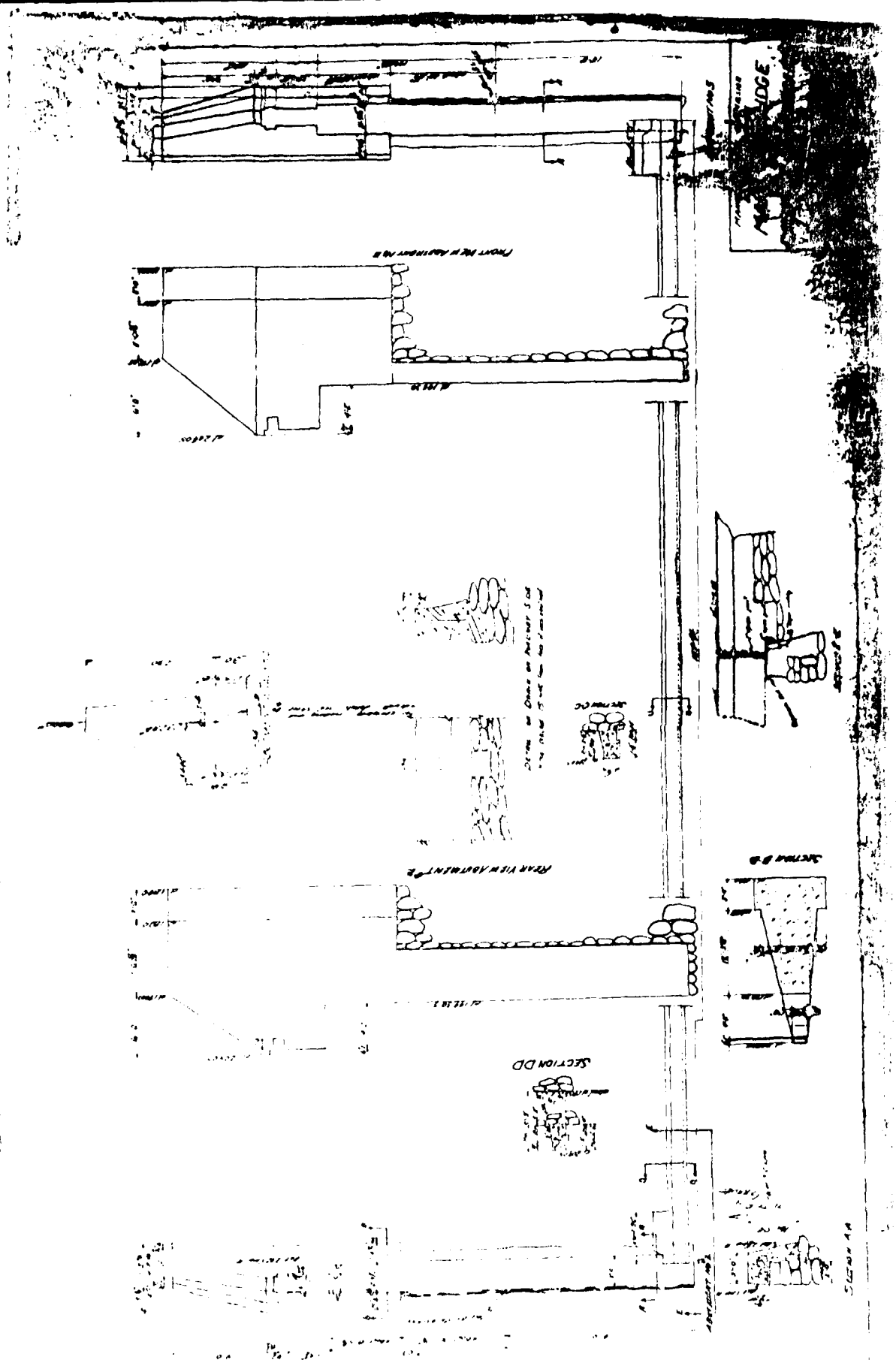
Inspection Party:

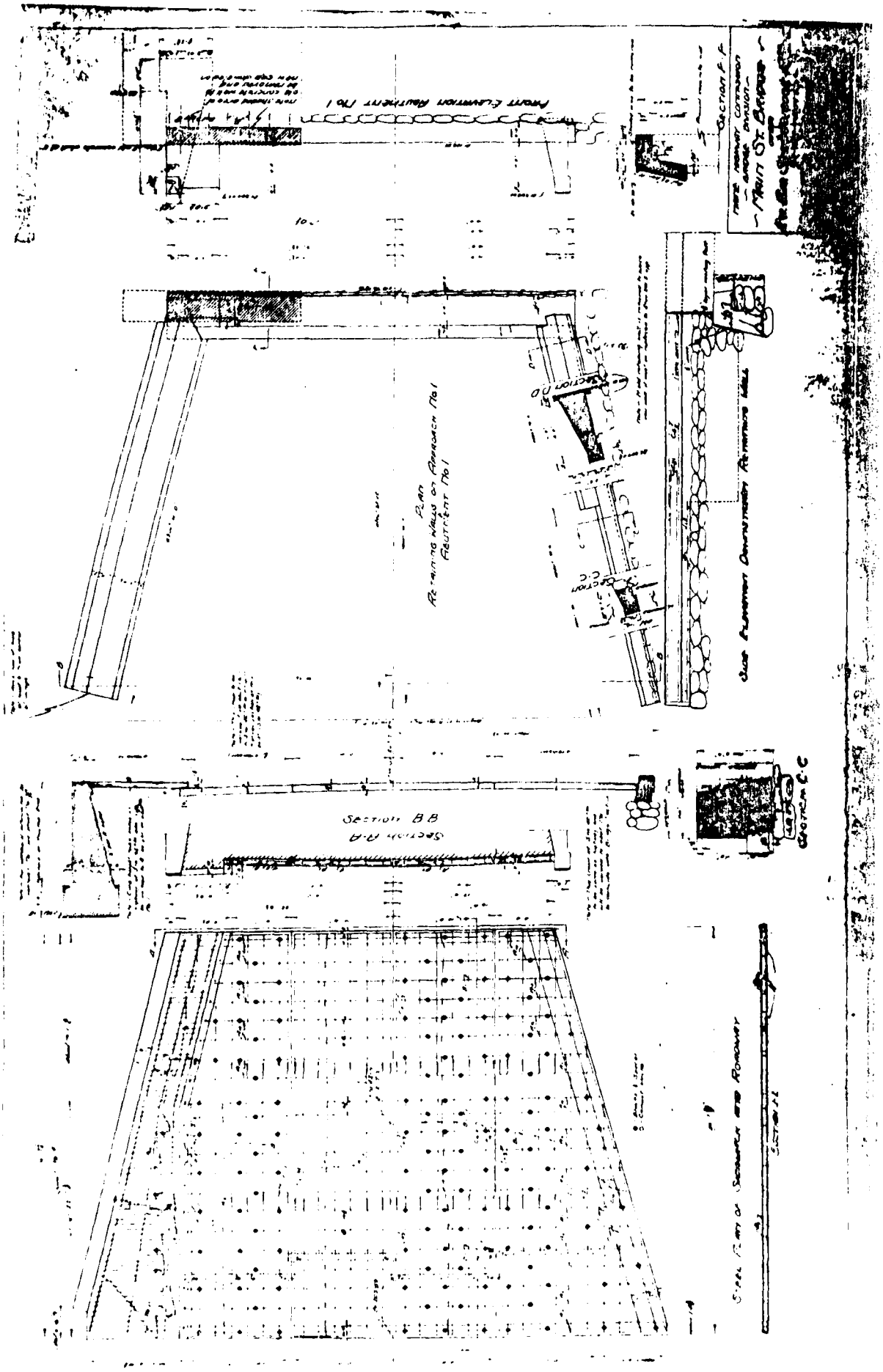
Douglas G. Gifford	-	Soils/Geology
Charles R. Nickerson Haley & Aldrich, Inc.		
Joseph E. Downing	-	Hydraulic/Hydrologic
Francis E. Luttazi Camp, Dresser & McKee, Inc.	-	Structural/Mechanical

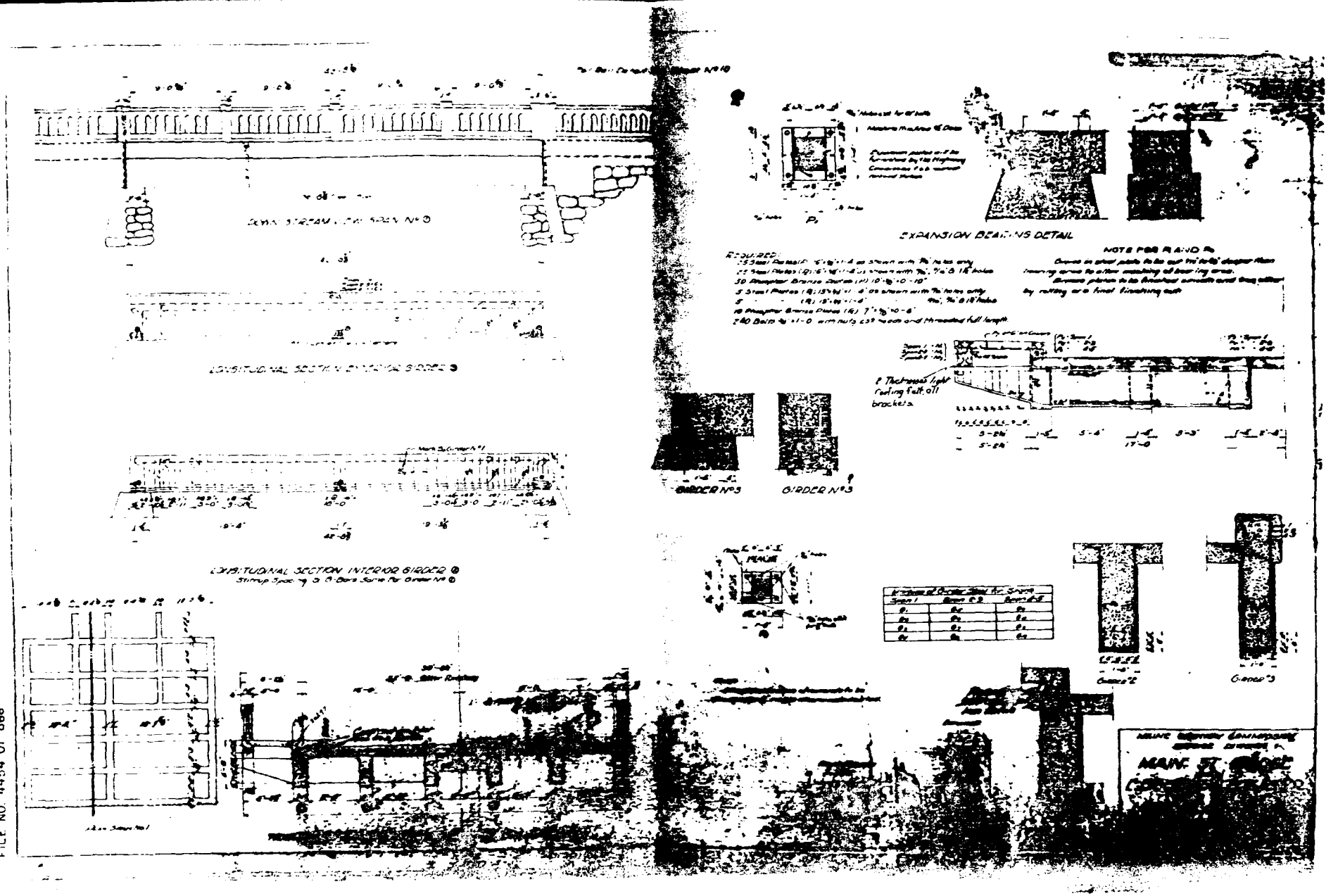
Met During Inspection:

C.B. Osgood, Newport Town Manager
Wilbur Bean, Guilford Industries






Section B.B
Section C.C



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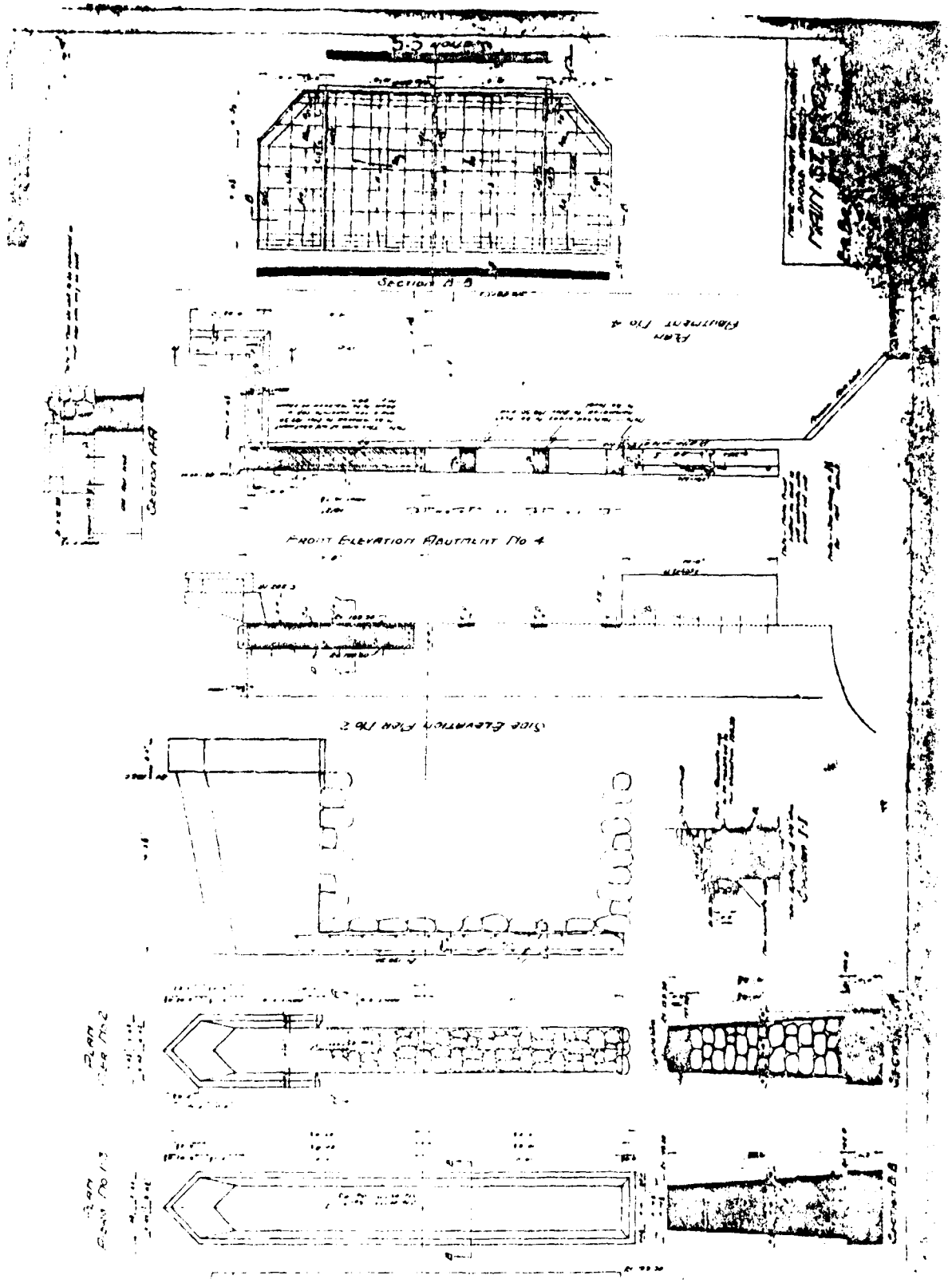
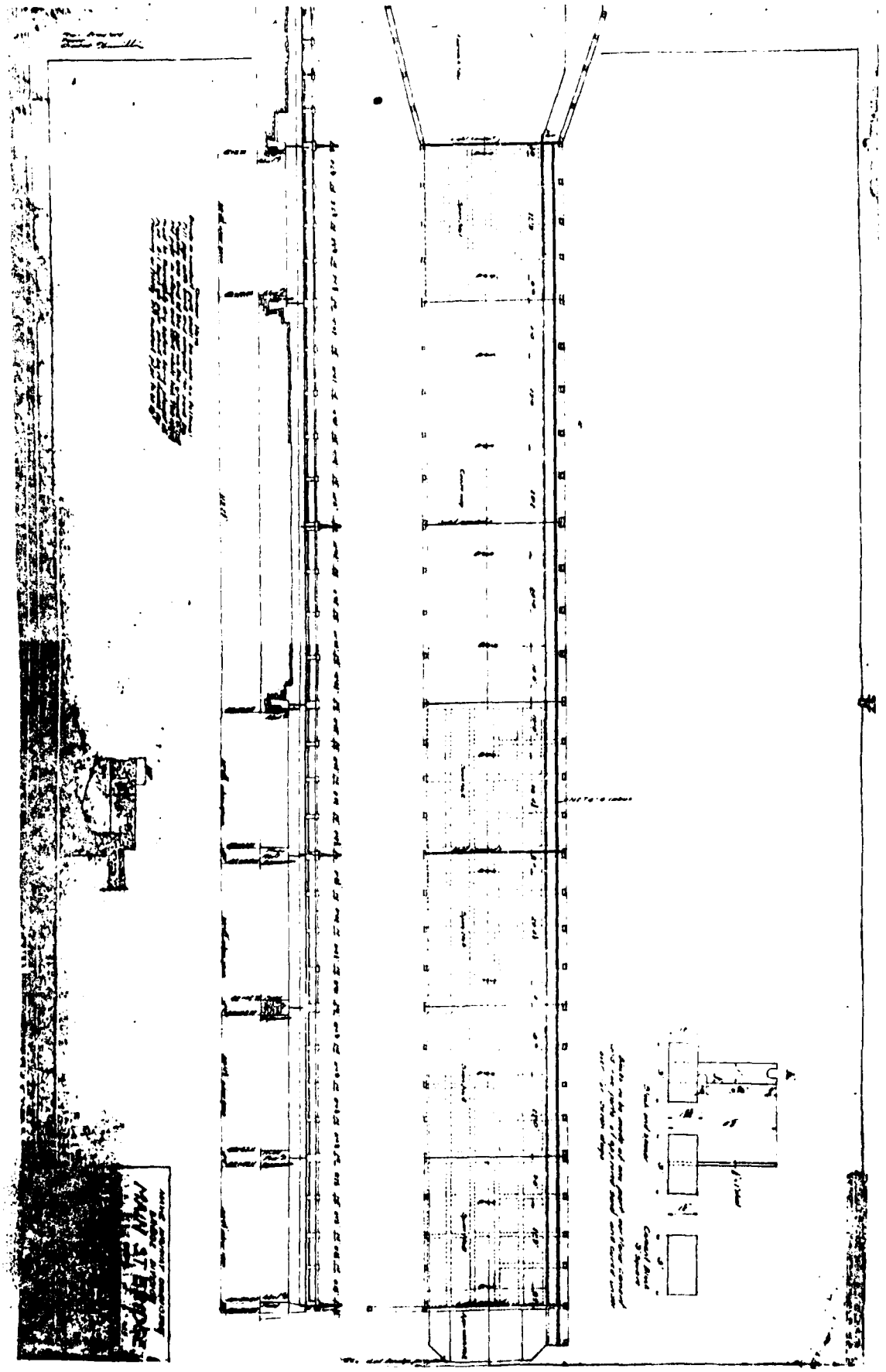
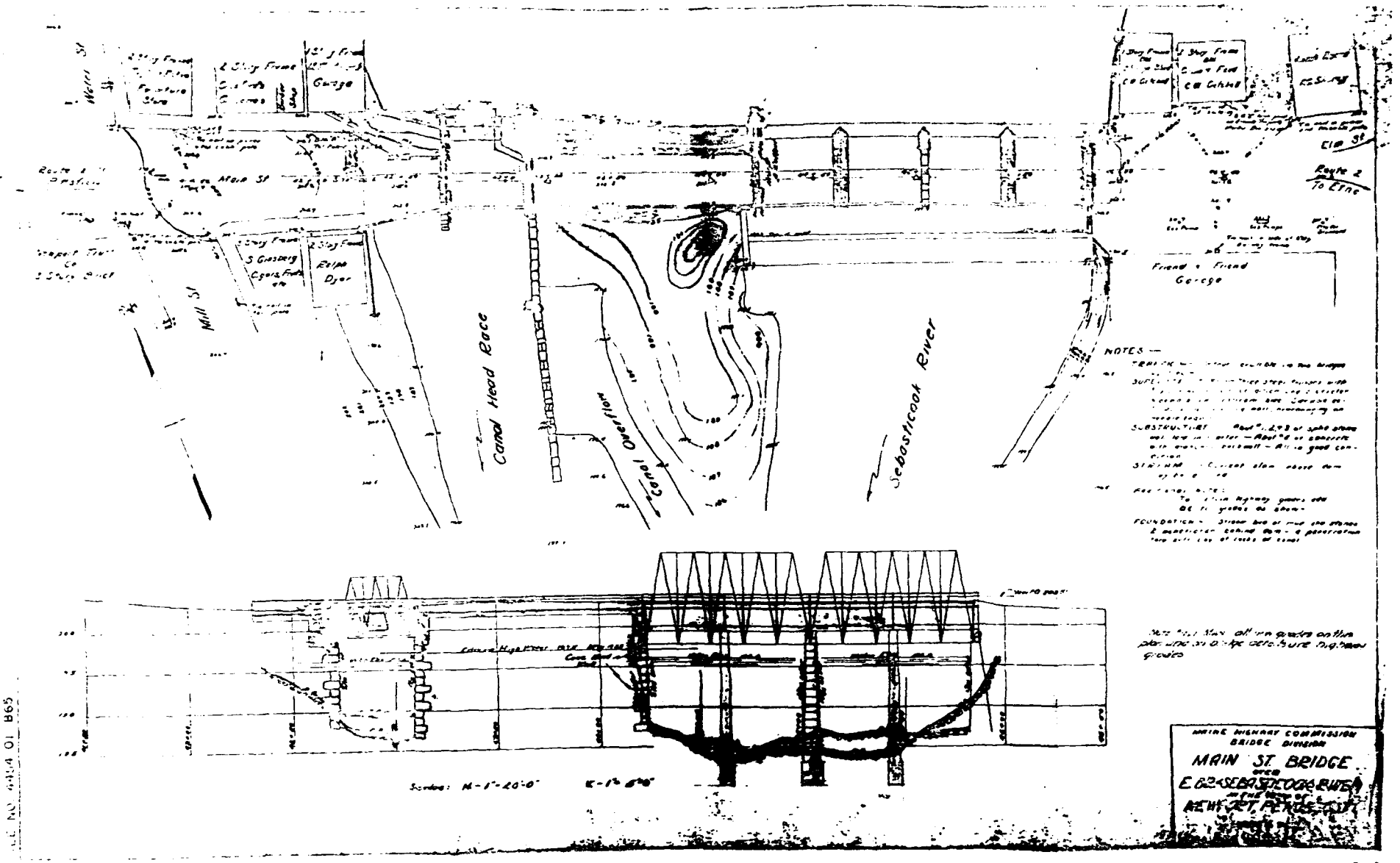
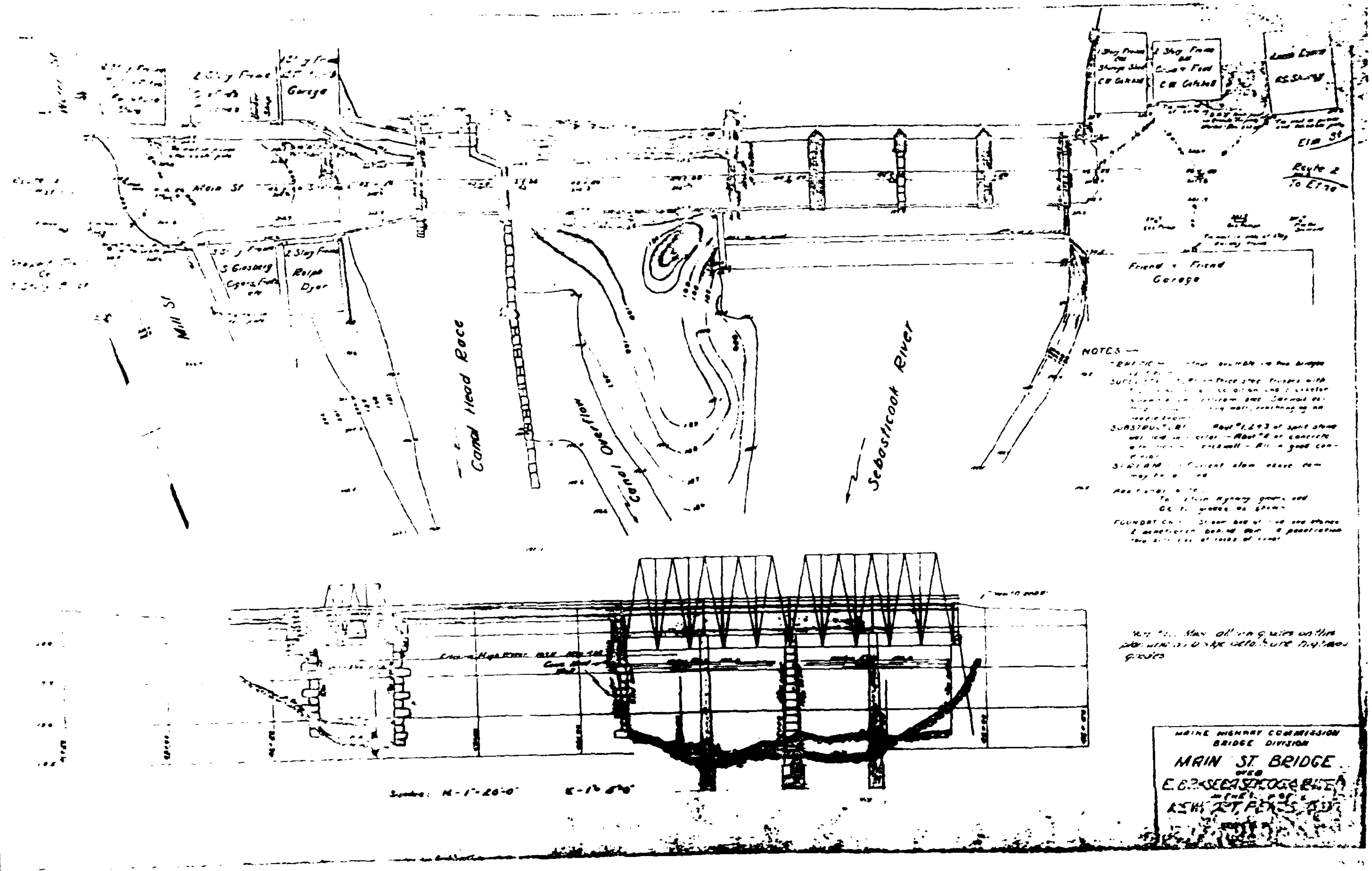

Section A-B
Front Elevation Pavilion No 4
Side Elevation Plan No 2




Mill St
Main St
Garage
Canal Head Race
Canal Overflow
Sebasticook River
Elm St
Route 2
To Etna
Friend's Friend
Garage
NOTES —
MAIN ST. BRIDGE
OVER
E. BR. SEBASTICOOK RIVER
AT THE REAR OF
NEWPORT, PENOBSCOT



NO. 4454 OF B65

LIST OF AVAILABLE DATA
MAIN STREET DAM

Document	Contents	Location
Design drawings for Main Street Bridge	Drawings show plan and profile view of Main Street Dam	State of Maine Department of Transportation Augusta, Maine
Municipal Tax atlases	Plan view of dam site property and properties adjacent to dam site	Town of Newport 27 Water Street Newport, Maine

APPENDIX B - ENGINEERING DATA

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Main Street Dam DATE: 5 Nov 80

AREA EVALUATED	CONDITION
c. Overflow Spillway	NOTE: Canal overflow spillway is a side weir on the canal left bank. The wall is of mortared granite block construction. D/S of the overflow spillway with respect to the dam, the canal left wall is an earth embankment
General Condition of Wall Including Spillway Weir	The portions of the masonry that were visible were in fair condition with loose joints and heavy vegetation growth (including trees) over length of wall
Rust or Staining	None noted
Spalling	None noted
Visible Reinforcing	None noted
Seepage or Effloresence	At several locations at spillway face thorugh top joint of granite blocks and at intersection of left canal wall with the dam
Drain Holes	None noted
d. Discharge Channel	NOTE: Canal overflow spillway discharges into a channel defined by left canal wall and a land mass located immediately D/S of the dam. This channel extends approximately 200 ft. before joining the spillway discharge channel
General Condition	Fair
Loose Rock Overhanging Channel	None noted
Trees Overhanging Channel	Right and left embankments are tree lined. Several trees within channel
Floor of Channel	Submerged
Other	Concrete spillway apron submerged beneath minor flow, however, undermining was noted

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Main Street Dam DATE: 5 Nov 80

AREA EVALUATED	CONDITION
Seepage	Minor through two of the wooden gates. The downstream face of the third gate was obscured by flowing water
Channel	Not applicable. Gates outlet into discharge channel of spillway
POWER CANAL, INTAKES, OVERFLOW SPILLWAY AND DISCHARGE CHANNEL	NOTE: A canal reported to be serving the purpose of fire protection for local industry is located to the right of the spillway. Intake gates for the canal are located U/S of the Main Street Bridge, and an overflow weir located on the left side of the canal, beginning approximately 38 ft. D/S of the dam, empties from the canal into the spillway discharge channel
a. Power Canal	
General Condition	Good
Loose Rock Overhanging Canal	None noted
Trees Overhanging Canal	Right and left canal banks were tree lined
Floor of Canal	Submerged
b. Intakes	NOTE: An accumulation of timber, brush and miscellaneous debris prevented a complete inspection of intake gates
Condition of Concrete	Poor. Major cracking observed at left intake gate training wall
Stoplogs and Slots	The three 7-ft. wide gates appeared to be in the open position. The deterioration of the timber portions of the gates and the distortion of the gate operators have rendered all three gates inoperable. A submerged steel bar rack was noted

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Main Street Dam DATE: 5 Nov 80

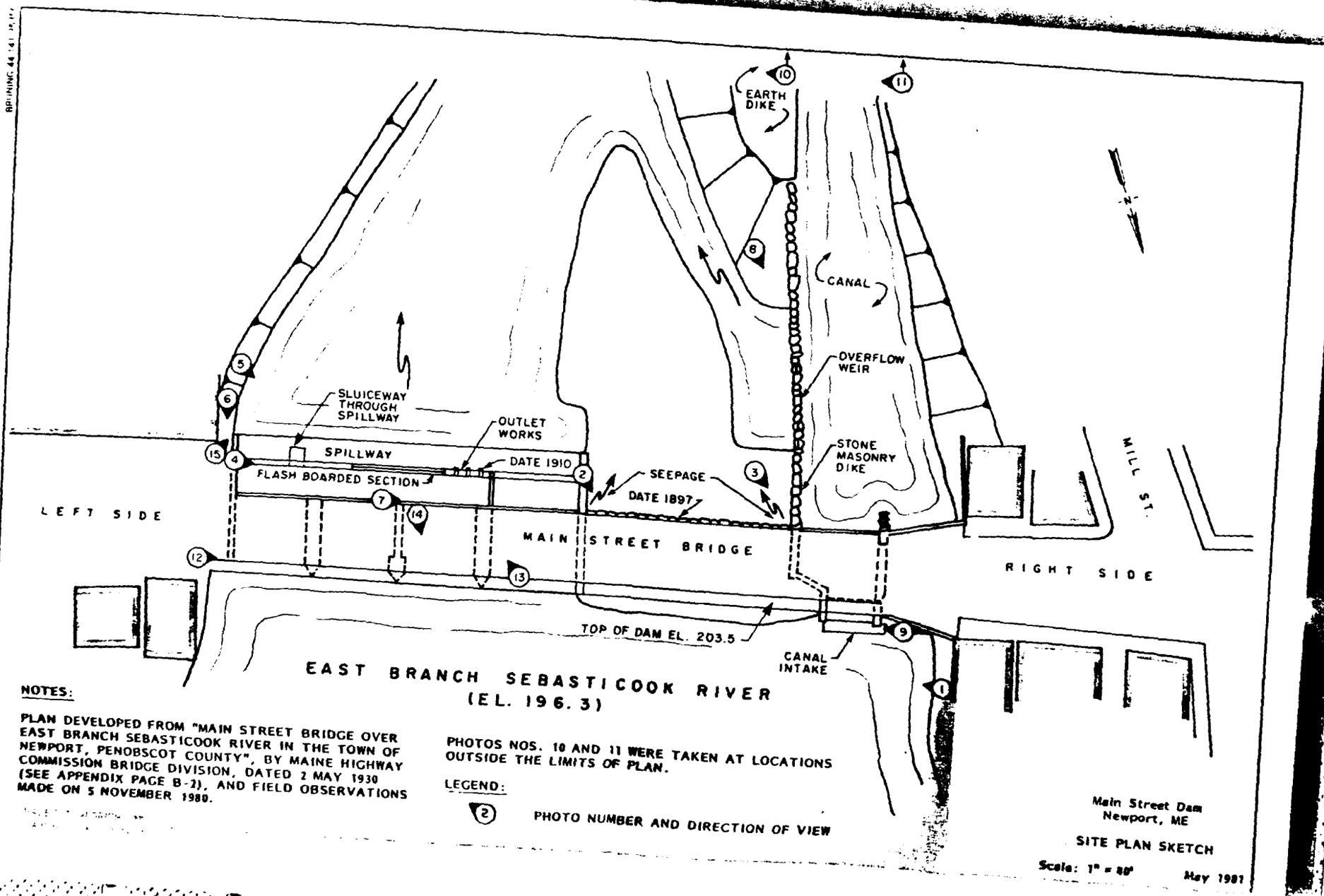
AREA EVALUATED	CONDITION
Seepage	Seepage at the D/S face of the masonry portion of the dam adjacent to the canal dike. The seepage was flowing from beneath an accumulation of stone block rubble and earth; estimated at 50 gpm. Ground surface at D/S toe of dam was consistently wet. Seepage was also noted at right side of spillway right training wall
Drain Holes	None noted
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None noted
Trees Overhanging Channel	Right and left banks of channel were were tree lined. Tree growth observed within channel
Floor of Channel	Submerged
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	NOTE: Three 4-ft. wide gates defined by four 2-ft. wide concrete training walls are located at the spillway beginning approximately 41.5 ft. from the right spillway training wall. Operators of two of the gates have been dismantled leaving only the middle gate operable
General Condition of Concrete	Poor
Rust or Staining	None noted
Erosion or Cavitation	At toe of each of the four gate training walls. Disintegration due to advanced stages of erosive action is especially exhibited at abutments at the far right and far left sides of the gate facility. The D/S portion of the toe of the left abutment of the middle gate is virtually non-existent apparently due to disintergration by erosion

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Main Street Dam DATE: 5 Nov 80

AREA EVALUATED	CONDITION
DAM, SPILLWAY, APPROACH AND DISCHARGE CHANNEL	
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	None noted
Trees Overhanging Channel	Right and left U/S banks are tree lined. Earth fill at U/S face of dam between canal intake gates and spillway has grass, brush and trees
Floor of Approach Channel	Submerged
Other Obstructions	Main Street Bridge is located immediately U/S of the spillway. Bridge piers exhibited erosive disintergration. Cracks, apparently reflecting the location of joints in the concrete bridge deck, were noted in the bituminous pavement. General condition of the Main Street Bridge was good
b. Dam and Spillway	
General Condition	Spillway was submerged at time of inspection. General condition of stone masonry portion of dam was fair
Rust or Staining	None noted
Spalling	Right D/S spillway training wall in poor condition with severe spalling, especially at joints
Visible Reinforcing	None noted
Cracking	Medium pattern cracking noted at right U/S concrete training wall at the U/S face of bridge
Joints	Some loose joints observed at right side of D/S face of masonry portion of dam

APPENDIX C - PHOTOGRAPHS



NOTES:

PLAN DEVELOPED FROM "MAIN STREET BRIDGE OVER EAST BRANCH SEBASTICOOK RIVER IN THE TOWN OF NEWPORT, PENOBSCOT COUNTY", BY MAINE HIGHWAY COMMISSION BRIDGE DIVISION, DATED 2 MAY 1930 (SEE APPENDIX PAGE B-2), AND FIELD OBSERVATIONS MADE ON 5 NOVEMBER 1980.

PHOTOS NOS. 10 AND 11 WERE TAKEN AT LOCATIONS OUTSIDE THE LIMITS OF PLAN.

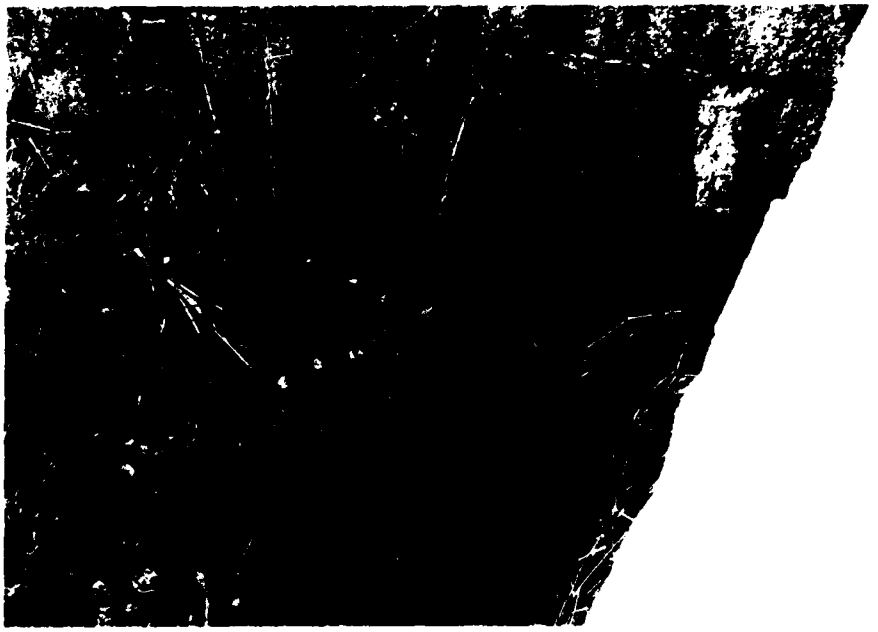
LEGEND:

(2) PHOTO NUMBER AND DIRECTION OF VIEW

Main Street Dam
Newport, ME

SITE PLAN SKETCH

Scale: 1" = 80' May 1981



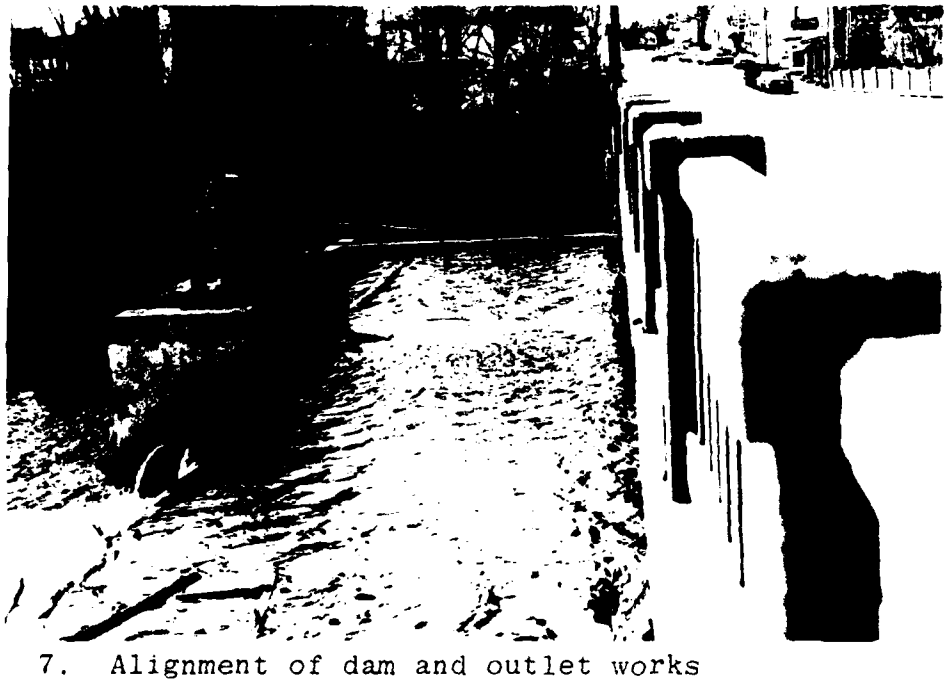
2. Location of seepage adjacent to right spillway training wall, downstream

3. Location of seepage adjacent to canal masonry dike, downstream

4. Longitudinal alignment of spillway from left abutment

5. Horizontal alignment of spillway from left abutment, downstream

6. Left abutment, downstream



7. Alignment of dam and outlet works

8. Vegetation at canal overflow weir, downstream

9. Canal intake structure, upstream

10. Breach at downstream end of dike

11. Eroded section of dike

12. Alignment of Main Street Bridge from left abutment

13. Cracks in bridge pavement

14. Upstream channel from Main Street Bridge

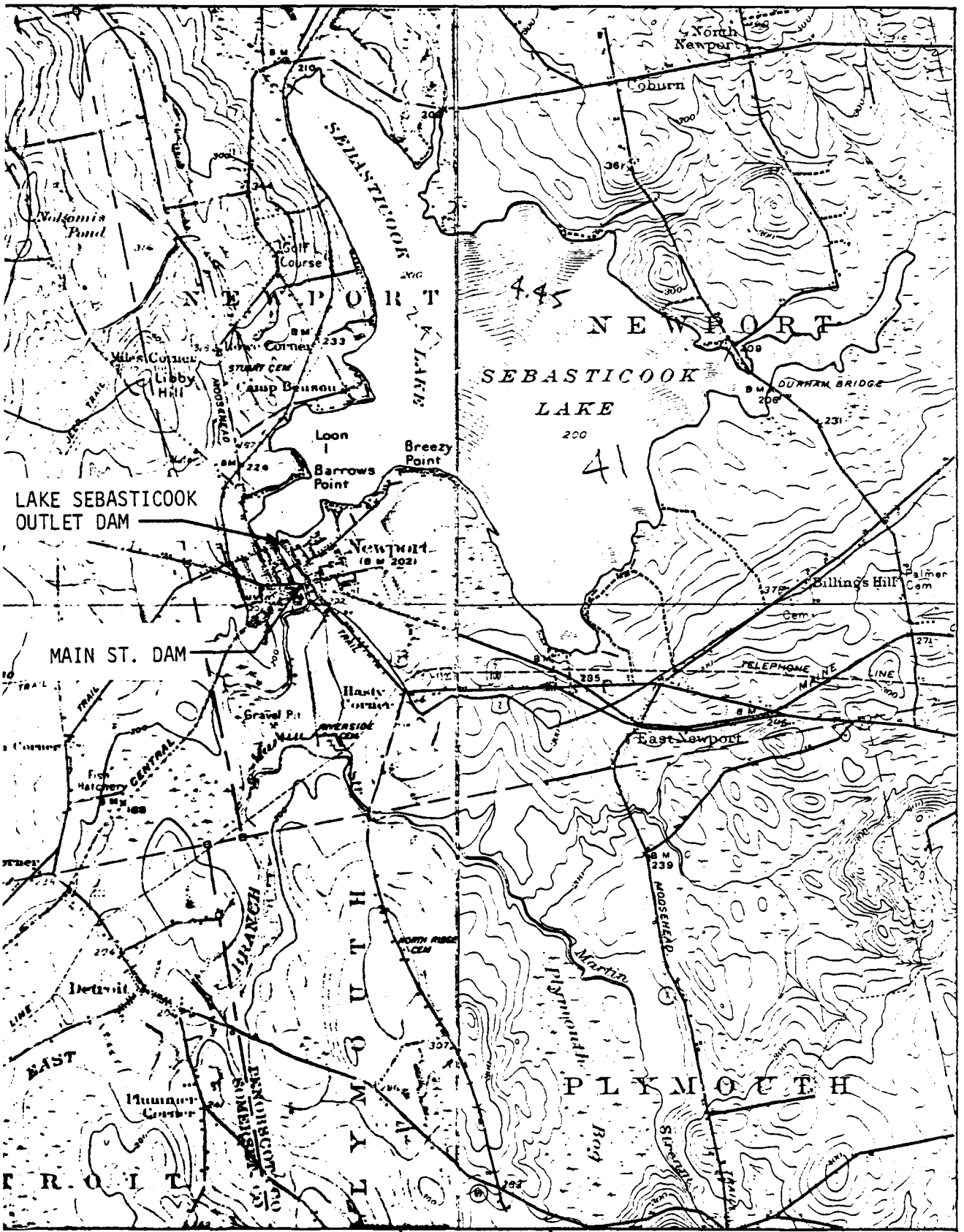
15. River channel immediately downstream of spillway from left abutment

APPENDIX D - HYDRAULIC AND HYDROLOGIC COMPUTATIONS

MAIN STREET DAM
ME 00114

DRAINAGE AREA MAP

APPROX. SCALE: 1" = 4 miles



MAIN STREET DAM
ME 00114

VICINITY MAP

APPROX. SCALE: 1" = 1 mile

McKEE CLIENT HAILEY & ALDRICH JOB NO. 561-10-RT-26 COMPUTED BY JED
PROJECT Phase I Dam Insp. DATE CHECKED 2-18-81 DATE 2/10/81
DETAIL Main St. Dam CHECKED BY JRA PAGE NO. 1 of 8

ELEVATIONS

USGS B.M. # K14, El. 201.919 is located on the R.R. tracks approx. 300 ft. d/s of dam. With the aid of a hand level, the spillway crest elev. was estimated to be El. 196.8 ±. Bridge Plans prepared by the Maine Highway Commission dated May, 1930 show a spillway crest elev. of 196.0 which will be adopted for this report.

Spillway Crest Elev. (Dam)	El. 196.0
Spillway Crest Elev. (Canal)	El. 195.7
Top of Dam (Rd. Curb)	El. 203.5
Top of Canal bank	El. 197.3 (varies)
Toe of Dam	El. 184.5
Inv. of Outlets	El. 185.5

FEATURES

Length of Spillway (Dam)	146.5 ft.
Length of Spillway (Canal)	70 ft.
Overflow crest length of dam (top of Road)	~350 ft.
Clearance between spillway crest and underside of bridge	3 ft.

Gated Outlets:

Gate struct. located ~100 ft. to the right of the spillway left abutment:

3 wooden slide gates, 4'W x 11'H each

Sluiceway located ~15 ft. to the right of the spillway left abutment:

~30"W x 42"H (est.)

SURFACE AREAS

Drainage Area ≈ 128 mi^2

There is no u/s pond as another dam is located ~2000 ft u/s

STORAGE CAPACITIES

U/s storage is minimal as the dam only impounds the portion of the East Branch Sebasticook River 2000 ft. u/s to the Sebasticook Lake Outlet Dam.

Avg. width of river u/s of dam = 350 ft.
" depth " " " " " = 6 ft. (normal)

then storage at spillway crest El. 196.0
$= (350' \times 6' \times 2000 \text{ ft.}) \div 43{,}560 = 96$ ac-ft.

storage at top of dam El. 203.5
$= (350' \times 7.5' \times 2000) \div 43{,}560 + 96 = 216$ ac-ft.

SIZE CLASSIFICATION

Height ≃ 19 ft. and storage at top of dam is 216 ac-ft.

∴ Size is SMALL

HAZARD CLASSIFICATION

Based on the dam failure analysis, the potential loss of life would be a few and the Hazard Classification is SIGNIFICANT

TEST FLOOD DETERMINATION

For a small size dam with a Significant hazard classification, Corps of Eng'rs Guidelines give a test flood range of 100-yr. flood to 1/2 PMF, (Probable Maximum Flood). Adopt 1/4 PMF as test flood.

The upstream drainage area is basically Flat & Coastal terrain with three lakes: Sebasticook, Pleasant, and Wassookeag Lakes. The combined W.S. area of these lakes is approx. 10.5 mi^2 or about 8 percent of the total D.A. Sebasticook Lake, which is impounded by a dam located ~2000 ft. u/s of Main St. Dam, is approx. 6.9 mi^2 in surface area.

From Corps of Eng'rs Guideline Curves, the CSM for a PMF on a 128 mi² D.A. having Flat & Coastal characteristics is ~375 CSM

Although there is not a significant pool u/s of the dam which would attenuate the test flood inflow, Sebasticook Lake is located about 2000 ft. u/s and controled by another dam of unknown geometry. As the normal W.S. area of Sebasticook Lake is 6.9 mi² or 4416 acres, the minimum surcharge-storage available for a 5 ft. surcharge height would be 4416 ac. × 5 ft. = 22,080 ac-ft.

$$= \frac{22{,}080 \text{ ac-ft.}}{128 \text{ mi}^2 \times 640 \frac{\text{ac}}{\text{mi}^2}} \times 12 \text{"/ft.} = 3.2 \text{" R.O.}$$

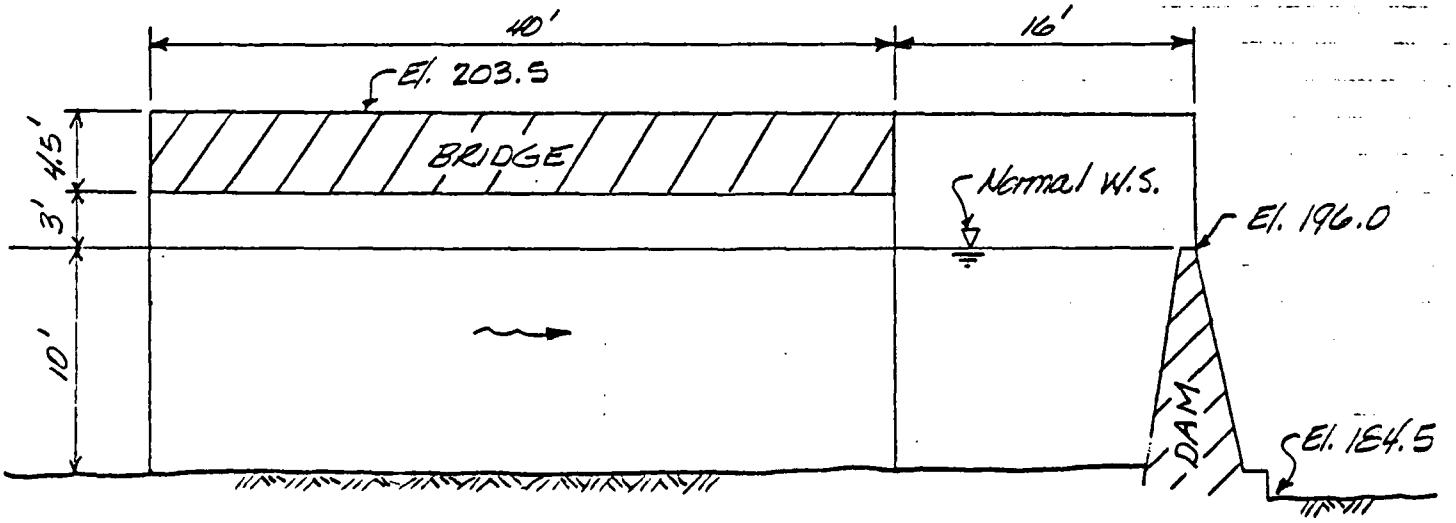
Since test flood R.O. = 19"/4 = 4.75", it would appear reasonable to assume that the Sebasticook Lake would reduce peak inflows by at least 25 percent.

then test flood @ Main St. Dam =

375 CSM × 75% × 128 mi² × 1/4 = 9,000 cfs

STAGE - DISCHARGE RELATIONSHIPS

The spillway approach channel's geometry is shown below:



The pond or river w.s. elevation u/s of the Main St. Bridge for spillway headwaters greater than 3 ft. will be influenced by the hydraulic losses through the bridge section. Also, the spillway hydraulics should account for the velocity of approach through the bridge section.

1. Establish rating curve for spillway using equation:

$$Q_s = CL\left[\left(H + \frac{V_o^2}{2g}\right)^{3/2} - \left(\frac{V_o^2}{2g}\right)^{3/2}\right]$$

where $C = 3.3$
$L = 146.5$ ft
H = W.S. elev. − 196.0
V_o = Vel. of approach thru bridge $= Q/A_b$
A_b = Area under bridge $= 13' \times 160' - \underbrace{8' \times 13' \times 3}_{\text{piers}} = 1768$ ft.^{2} for W.S. ≥ 199.0

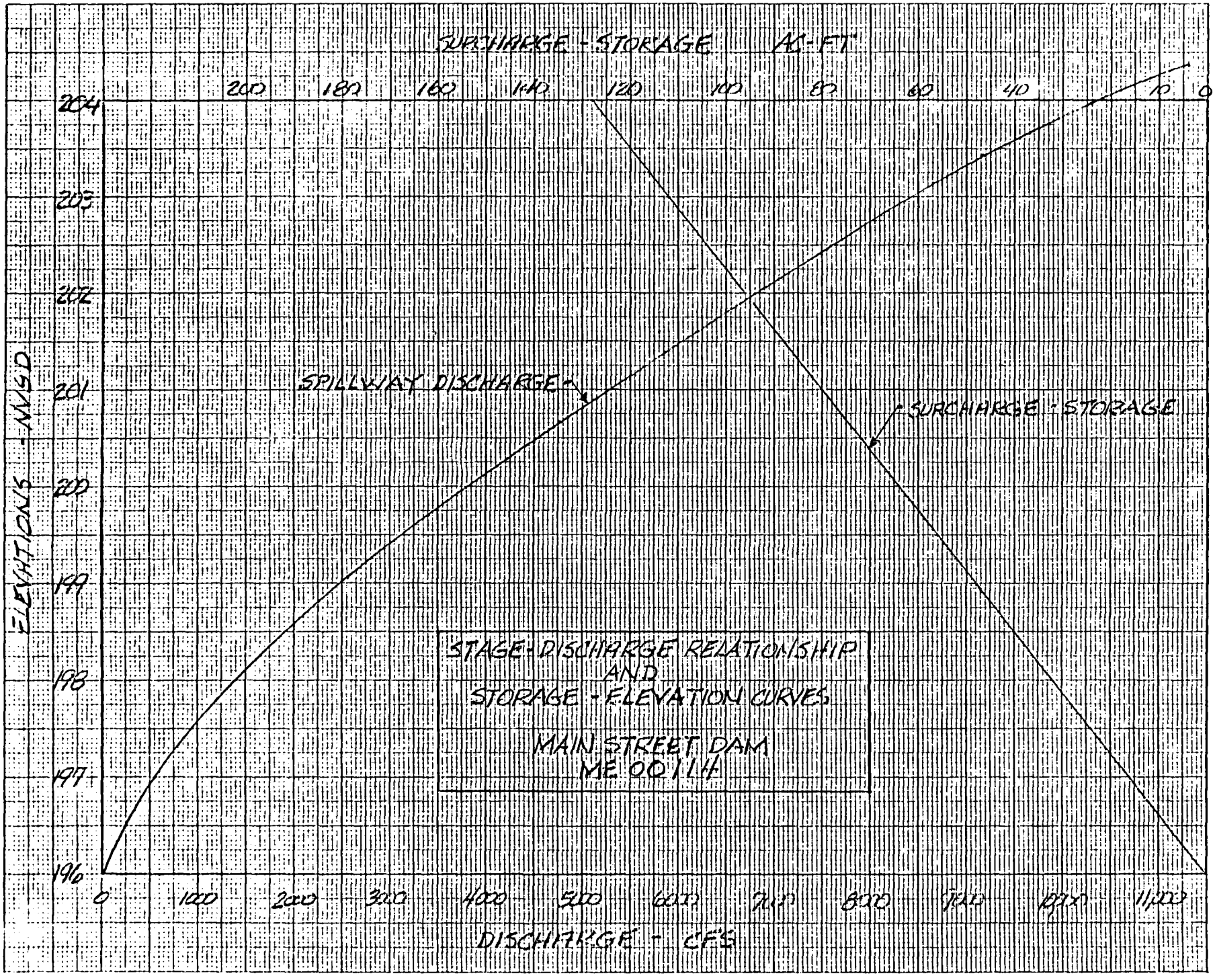
2. W.S. at u/s face of bridge $= H + h_L$

where $h_L = 1.5\, V_o^2/2g$

3. Flow over bridge for U/S W.S. > El. 203.5

$Q = CLH^{3/2}$ where $C = 2.0$ (allows for guard rails)
$L = 350$ ft.
H = U/S W.S. − 203.5

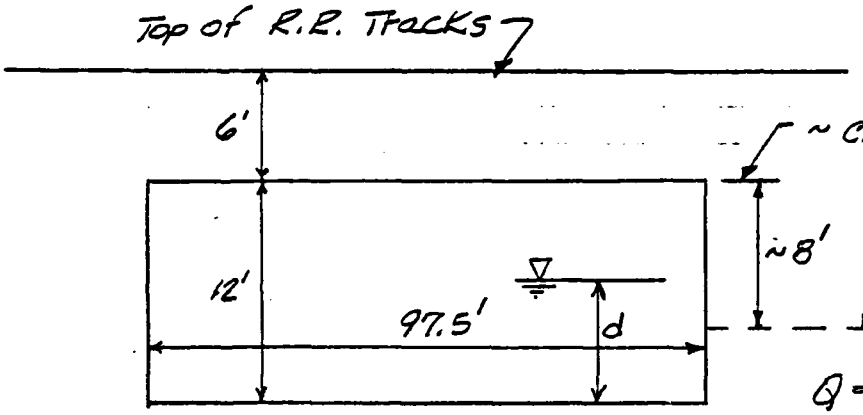
W.S. Elev. D/S of Bridge	Q_s trial (cfs)	V_o trial (fps)	Q_s (cfs)	V_o (fps)	$h_L = 1.5 V_o^2/2g$ (ft.)	W.S. Elev. U/S of Bridge	Flow over Road (cfs)
196.0	–	–	0	0	0	196.0	–
199.0	2510	1.42	2550	1.44	0.05	199.05	–
200.5	4615	2.61	4760	2.69	0.17	200.67	–
202.0	7110	4.02	7490	4.24	0.42	202.42	–
203.5	9930	5.62	10,750	6.08	0.86	204.36	560
[202.8	8570	4.85	9,170	5.18	0.63	203.43	–]


SURCHARGE - STORAGE AC-FT
200
180
160
140
120
100
80
60
40
20
0
204
203
202
201
200
199
198
197
196
ELEVATIONS - MSD
SPILLWAY DISCHARGE
SURCHARGE : STORAGE
STAGE-DISCHARGE RELATIONSHIP
AND
STORAGE - ELEVATION CURVES
MAIN STREET DAM
ME 00114
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10,000
11,000
DISCHARGE - CFS

From the foregoing approx. evaluation of the spillway hydraulics, it would appear that with water at top of dam (El. 203.5) at the u/s face of bridge, the head on the spillway would be at elev. 202.8+ and the spillway discharge capacity is ~ 9,200 cfs which indicates that the estimated test flood of 9,000 cfs would not overtop the dam.

TAILWATER ANALYSIS

Control section is R.R. Bridge ~300 ft. d/s of dam



$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

$$= 1.49/0.04\, A R^{2/3} (0.0025)^{1/2}$$

$$= 1.863\, A R^{2/3}$$

W.S. Elev. D/S of Dam	Depth (d) (ft.)	Area (ft.²)	R	Q (cfs)	
188.0	4	390	3.697	1,750	
190.0	6	585	5.342	3,340	
194.0	10	975	8.230	7,430	at Q = 9,200 cfs, T.W. El. = 195.5
196.0	12	1170	9.630	9,850	

OUTLET WORKS

Assume the three 4-ft. wide wooden slide gates can be raised 6-ft.

$Q_G = CA\sqrt{2gh} \times 3$ where $C = 0.7$
$A = 4' \times 6' = 24\ ft^2$
h = W.S. El. − 185.5 − 3'

For W.S. at spillway crest elev. 196.0

$Q_G = 0.7 \times 24 \times (64.4 \times 7.5)^{1/2} \times 3 \simeq 1{,}110$ cfs

For W.S. at top of dam at u/s face (el. 203.5), W.S. at spillway = elev. 202.8

$Q_G = 0.7 \times 24 (64.4 \times 14.3)^{1/2} \times 3 \simeq 1{,}530$ cfs

DAM FAILURE ANALYSIS

Assume 40% of spillway crest length between the left abutment and the outlet works gate structure fails.

then $Q_{P_1} = 8/27 \times (105' \times 0.4) \times (32.2)^{1/2} (202.8 - 184.5)^{3/2} = 5{,}530$ cfs

Flow over spillway to the right of outlet works:

$Q_S' = 9{,}200$ cfs $\times$ 41.5/146.5 = 2,610 cfs

Flow over portion of spillway to the left of outlet works which does not fail:

$Q_S'' = 9{,}200$ cfs $\times$ 105/146.5 $\times$ 0.6 = 3,960 cfs

Then combined out flow at failure = $Q_{P_1} + Q_S' + Q_S''$

$= 5530 + 2610 + 3960 = 12{,}100$ cfs

Increase in downstream flow resulting from failure = 12,100 − 9,200 $\simeq$ 3,000 cfs

Existing development d/s of dam which could potentially be impacted by a dam failure includes a commercial building at the left abutment. This is a wooden structure having first floor window sills about 2 ft. lower than the spillway crest.

Although the increase in flow resulting from a dam failure would not be great (3,000 cfs), failure of the spillway adjacent to the building's foundation could threaten the structure.

The mill complex located d/s of the R.R. bridge (~ 300' d/s of dam) would be flooded by the spillway discharge of 9,200 cfs prior to failure. The floor elev. of the b'ldgs adjacent to the Sebasticook River are about 4 to 5 ft. above the river bed. An increase in flow a 3,000 cfs resulting from a dam failure would increase flooding depths but the R.R. embankment would serve to buffer the mill from the direct impact of the failure flood wave.

Consequently, the potential for loss of life as a result of a dam failure would be limited to the commercial structure at the dam's left abutment and the hazard is therefore significant.

APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

8-85

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